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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/847,622	05/02/2001	Manfred Horstmann	2000.064200	5606

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EXAMINER

FENTY, JESSE A

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 05/08/2002

#7

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/847,622

Applicant(s)

HORSTMANN ET AL.

Examiner

Jesse A. Fenty

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 10-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 27-34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I, claims 1-9 and 27-34 in Paper No. 6 is acknowledged.

Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. Claims 10-26 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Election was made **without** traverse in Paper No. 6.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2 and 5-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamaguchi et al. (U.S. Patent No. 5,144,393).

In re claim 1, Yamaguchi (Figs. 1A-5G) discloses a semiconductor device, comprising:

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A substrate (41);

An active region;

A gate insulation layer (48) formed above said active region; and

A gate electrode (52, 62) formed above said gate insulation layer, said gate electrode having a middle portion (52) located over the active region, said middle portion having a gate length and a gate height, wherein a cross-sectional area of said gate electrode in a plane defined by said gate length and said gate height of the middle portion exceeds a value obtained by multiplying the gate length by the gate height.

In re claim 2, Yamaguchi discloses the device of claim 1, wherein a lower part of said middle portion (a portion above the oxide 44) has a cross-sectional area in the plane defined by a gate length and a gate height that is substantially rectangular.

In re claim 5, Yamaguchi discloses the device of claim 1, wherein the sidewalls of the lower part are covered by silicon dioxide. The limitation, "thermally grown" is a product by process limitation that does not distinguish the final product of the claimed invention to that known to prior art and thus is not given patentable weight.

In re claim 6, Yamaguchi discloses the device of claim 1, wherein the gate electrode comprises polycrystalline silicon and a metal.

In re claim 7, Yamaguchi discloses the device of claim 1, where the upper part comprises a metal.

In re claim 8, Yamaguchi discloses the device of claim 1, wherein the substrate is a semiconductor substrate.

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6. Claims 27-31, 33 and 34 are rejected under 35 U.S.C. 102(b) as being anticipated by Choi et al. (U.S. Patent No. 5,621,236).

In re claim 27, Choi (Fig. 2, 3E) discloses a semiconductor device, comprising:

A substrate (15);

A gate insulation layer (17) formed above said substrate;

A gate electrode formed above said gate insulation layer, said gate electrode having an upper portion (21, 33) and a lower portion (19), said upper portion having a plurality of extensions formed thereon (33), said extensions of said upper portion extending laterally beyond said lower portion of said gate electrode.

In re claim 28, Choi discloses the device of claim 27, further comprising an insulating material (27b) positioned adjacent said lower portion of said gate electrode and under said extensions formed on said upper electrode.

In re claim 29, Choi discloses the device of claim 27, wherein said substrate is comprised of silicon.

In re claim 30, Choi discloses the device of claim 27, wherein said gate insulation layer is comprised of silicon dioxide.

In re claim 31, Choi discloses the device of claim 27, wherein said lower portion of said gate electrode is comprised of polysilicon (column 2, line 24).

In re claim 33, Choi discloses the device of claim 27, wherein said extensions are comprised of polysilicon (column 3, line 22).

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In re claim 34, Choi discloses the device of claim 27, wherein said upper portion of said gate electrode and said extensions have a combined lateral dimension that is approximately 5-100 percent greater than a lateral dimension of said lower portion of said gate electrode.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi et al. as applied to claim 2 above, and further in view of Choi et al..

In re claim 3, Yamaguchi discloses the device of claim 2, but does not expressly disclose an upper part of said middle portion decreasing from bottom to top. Choi (Fig. 2, 3E) discloses an upper part (33) of the middle portion (23) of a gate electrode structure decreasing from bottom to top. It would have been obvious to modify the gate extensions of Yamaguchi with the gate extensions disclosed by Choi for the purpose, for example, of reducing the gate-to-drain capacitance of the device (Choi; column 3, lines 66-67; column 4, line 1).

9. Claims 4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi et al.

In re claim 4, Yamaguchi discloses the device of claim 1, but does not expressly disclose the gate length of 100nm or less. However, such dimensions are well known in the art and it

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would have been obvious to one having ordinary skill in the art at the time the invention was made to determine an exemplary length for the gate based on what is known in the art, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F. 2c 272, 205 USPQ 215 (CCPA 1980).

In re claim 9, Yamaguchi discloses the device of claim 1, but does not disclose the substrate being an SOI substrate. However, it would have been obvious to one skilled in the art at the time of the invention to substitute an SOI substrate for the purely silicon substrate of Yamaguchi for the well-known purpose, for example, of stabilizing the undercurrents in the substrate and providing a much more reliable device.

10. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Choi et al. (as above).

In re claim 32, Choi discloses the device of claim 27, wherein the upper portion of the gate electrode comprises tungsten silicide but does not expressly disclose the upper portion of the gate electrode comprising polysilicon. However, it would have been obvious to one skilled in the art at the time of the invention to replace the silicide layer disclosed by Choi with an additional polysilicon layer for the purpose, for example, of streamlining production, but also to better regulate the speed of the device.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yamazaki (U.S. Patent No. 5,391,905); Liang (U.S. Patent No. 5,623,153); Chan et

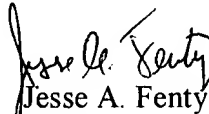
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al. (U.S. Patent No. 6,306,715 B1) and Mandelman et al. (U.S. Patent No. 6,097,070) disclose very similar device structures to that of the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 703-308-8137. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 703-308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-746-3892 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


Jesse A. Fenty
Examiner
Art Unit 2815

JAF
May 5, 2002